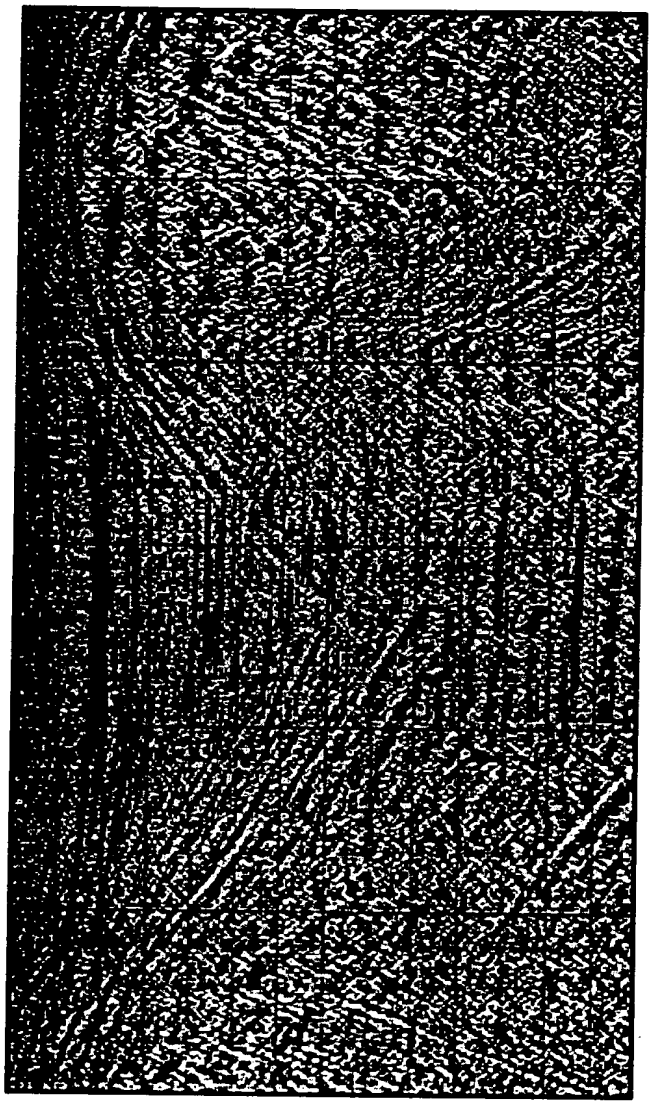


Figure 1

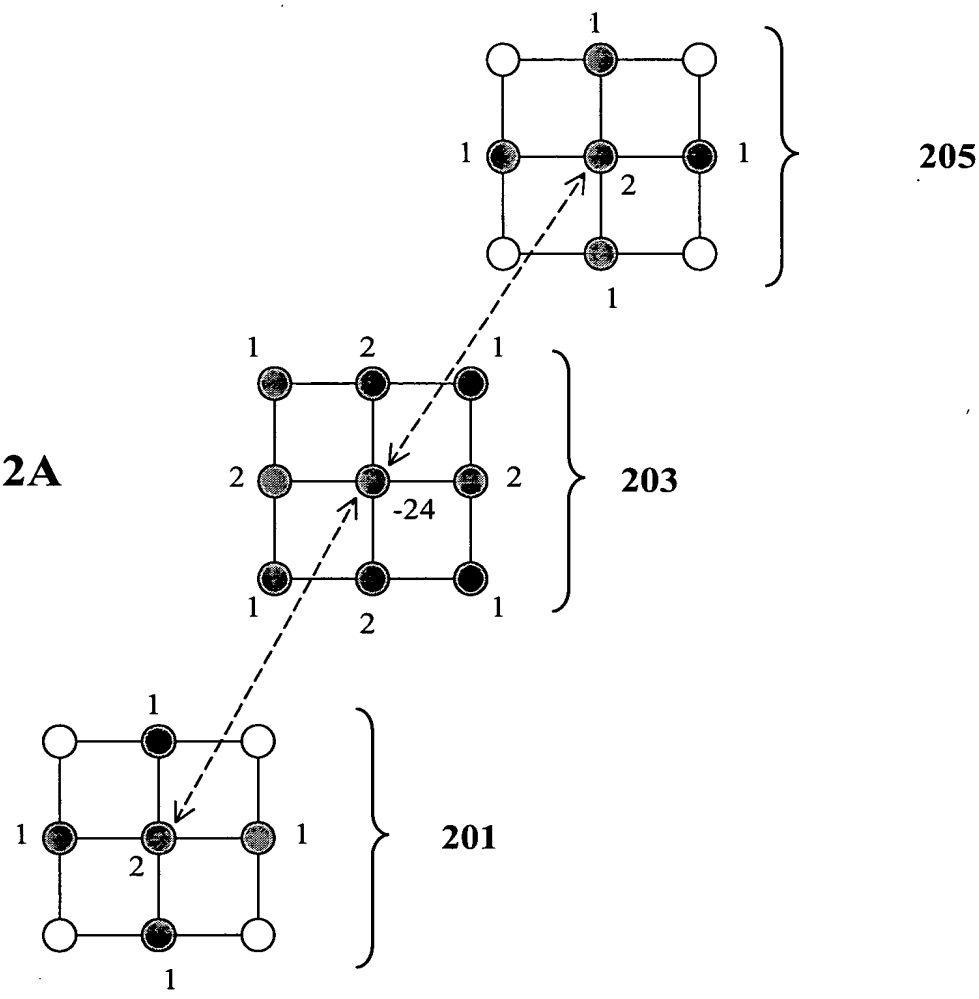


Figure 2A

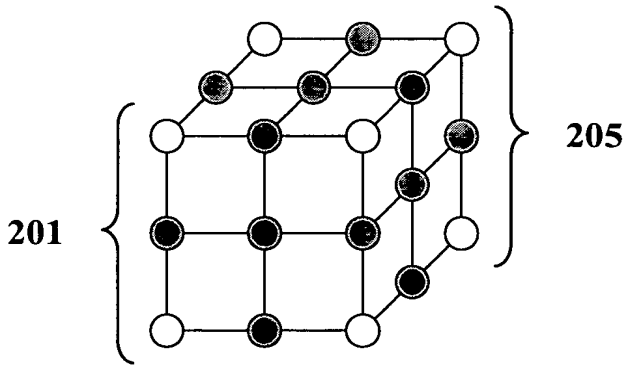


Figure 2B

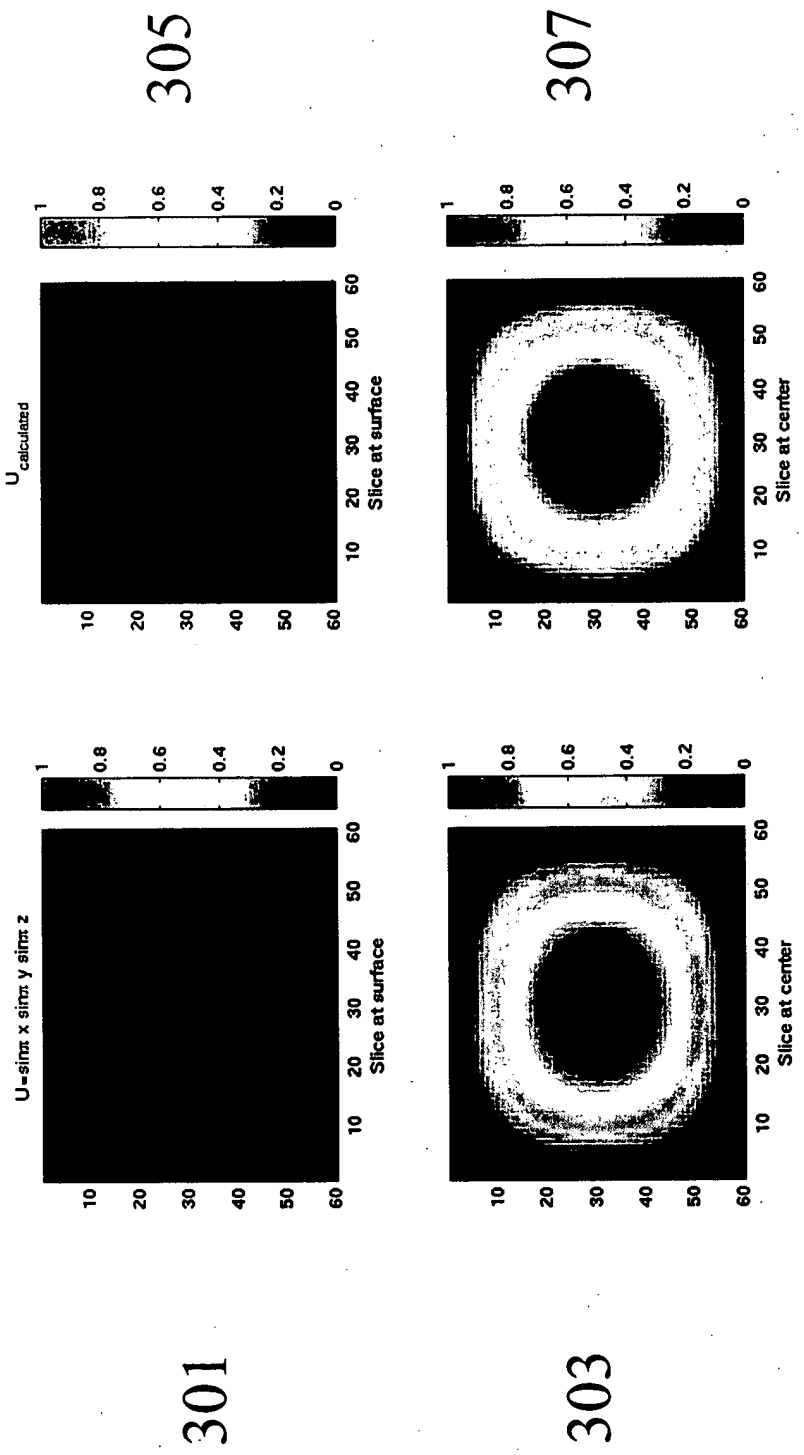

305
307
301
303
U calculated
U-sim: x sim: y sim: z
Slice at surface
Slice at center
Slice at surface
Slice at center

Figure 3

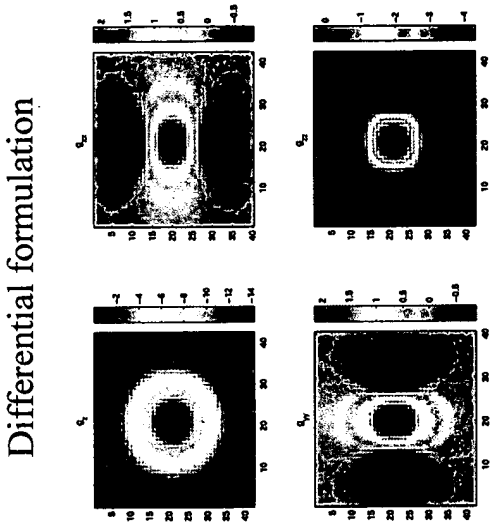


Figure 4B

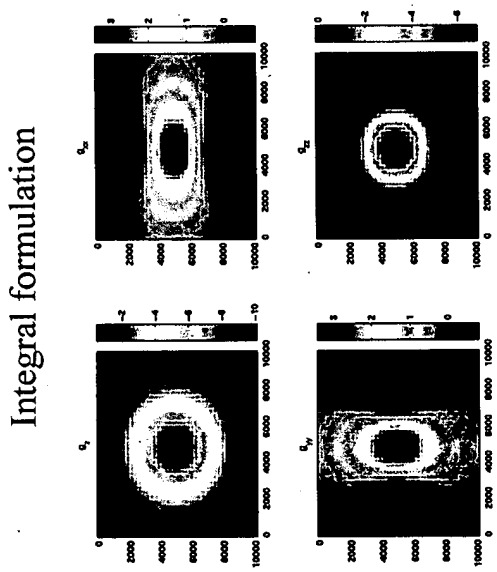


Figure 4A

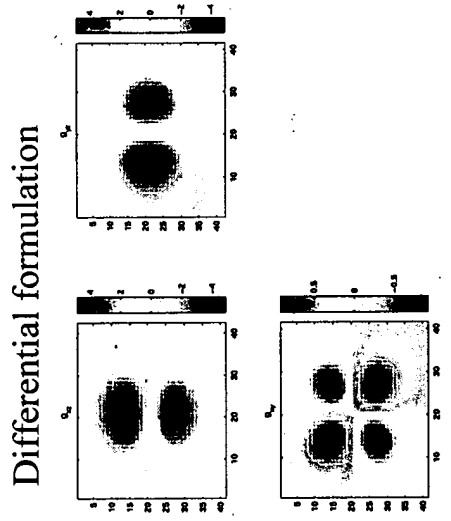


Figure 4D

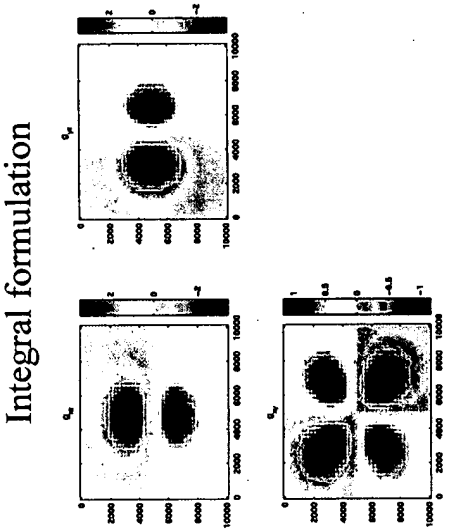


Figure 4C

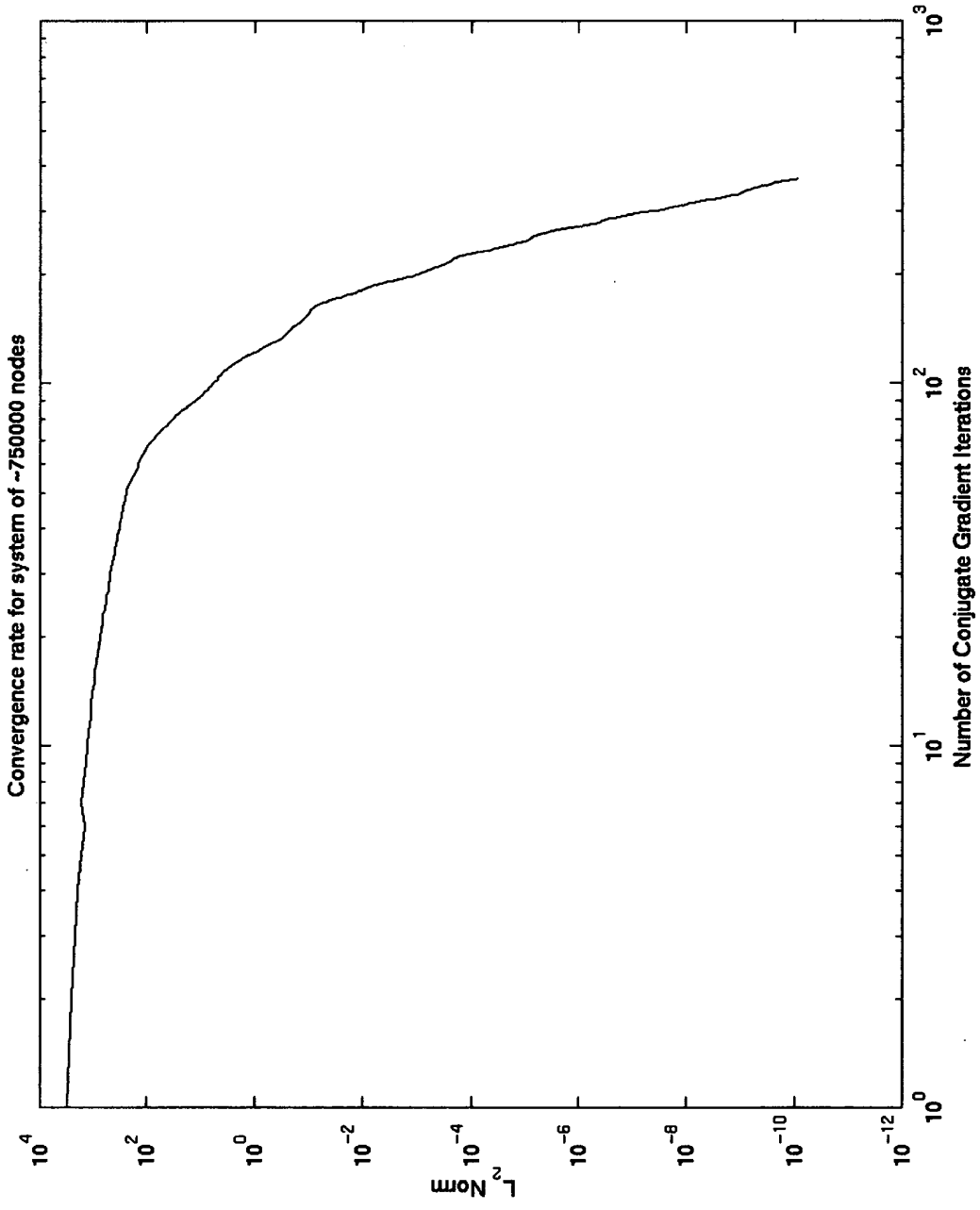

Convergence rate for system of ~750000 nodes
L2 Norm
Number of Conjugate Gradient Iterations
10^4
10^2
10^0
10^-2
10^-4
10^-6
10^-8
10^-10
10^-12
10^0
10^1
10^2
10^3

Figure 4E

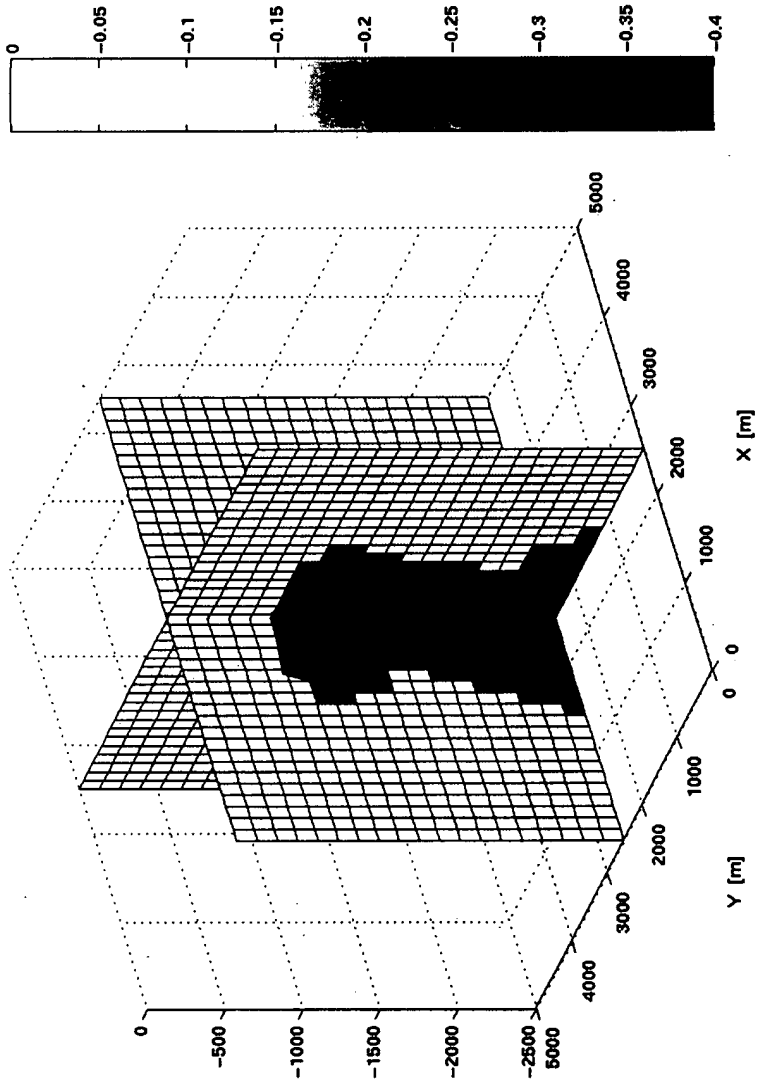
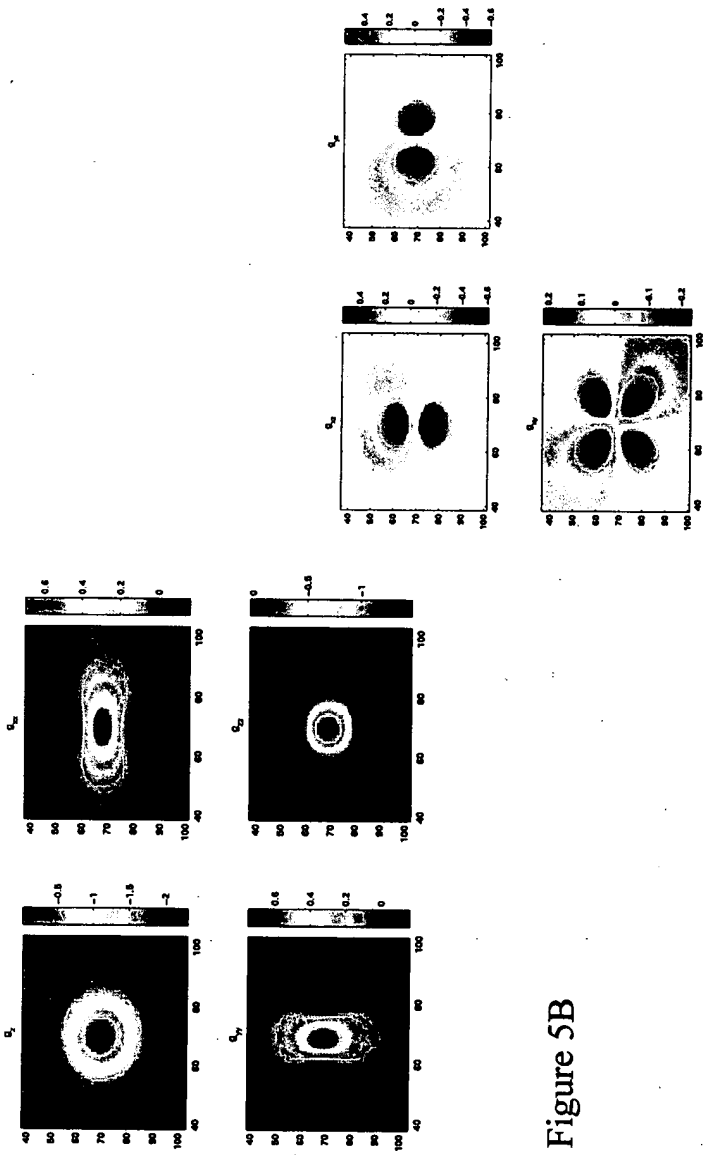

0
-0.05
-0.1
-0.15
-0.2
-0.25
-0.3
-0.35
-0.4
5000
4000
3000
2000
1000
0
X [m]
0
1000
2000
3000
4000
5000
Y [m]
0
-500
-1000
-1500
-2000
-2500

Figure 5A



Finite Difference results:

Figure 5B

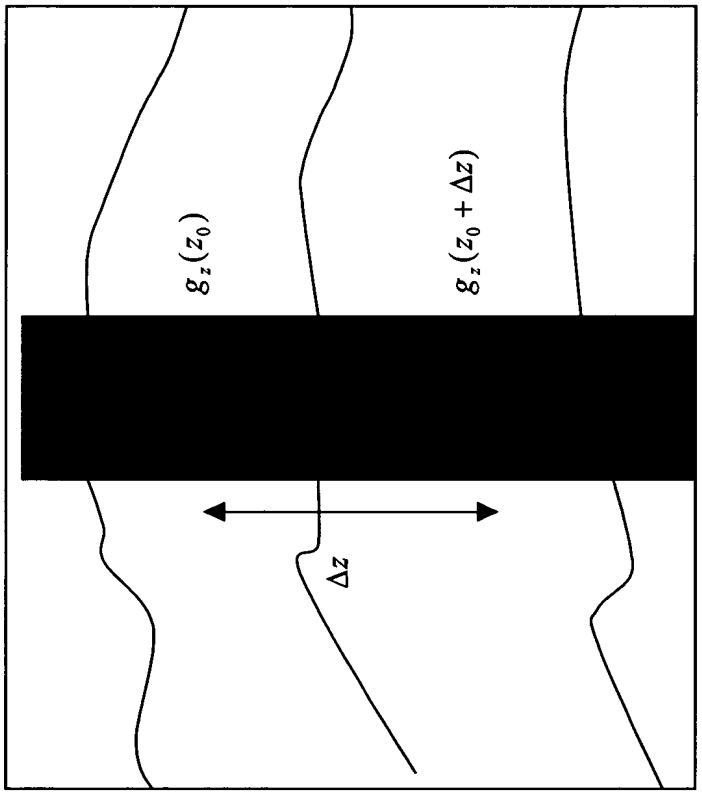
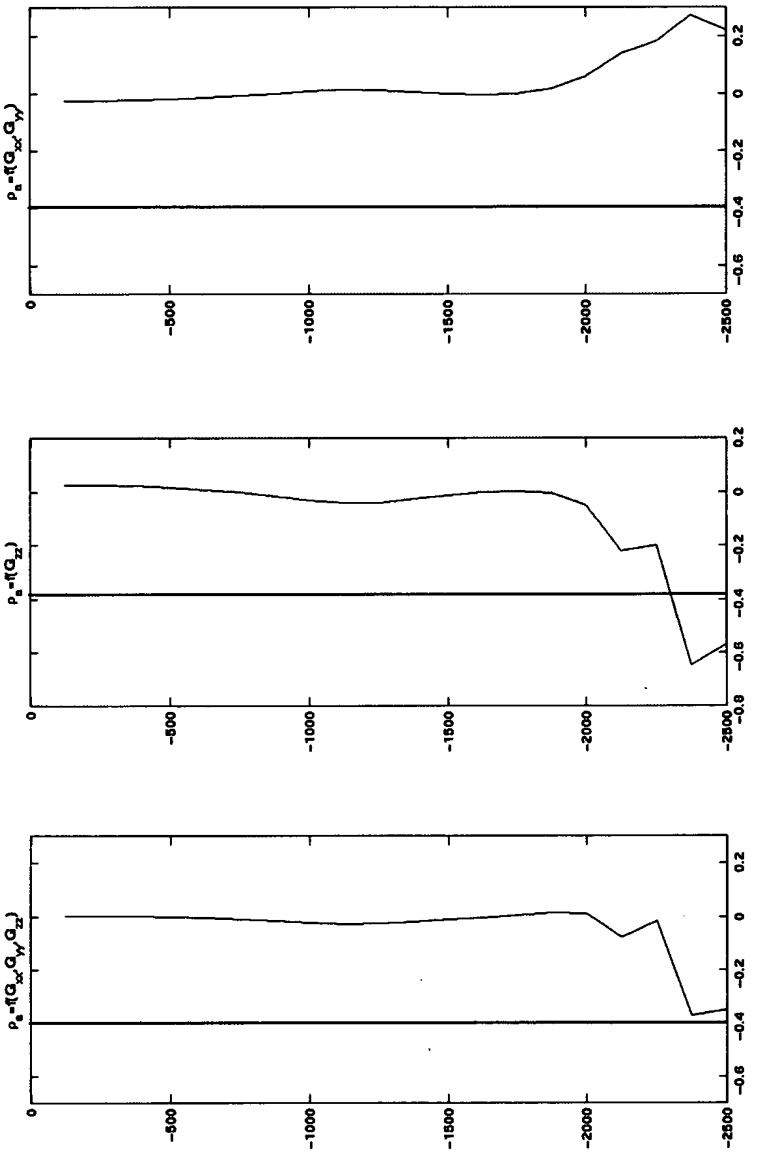


Figure 6

Figure 7



703

702

701

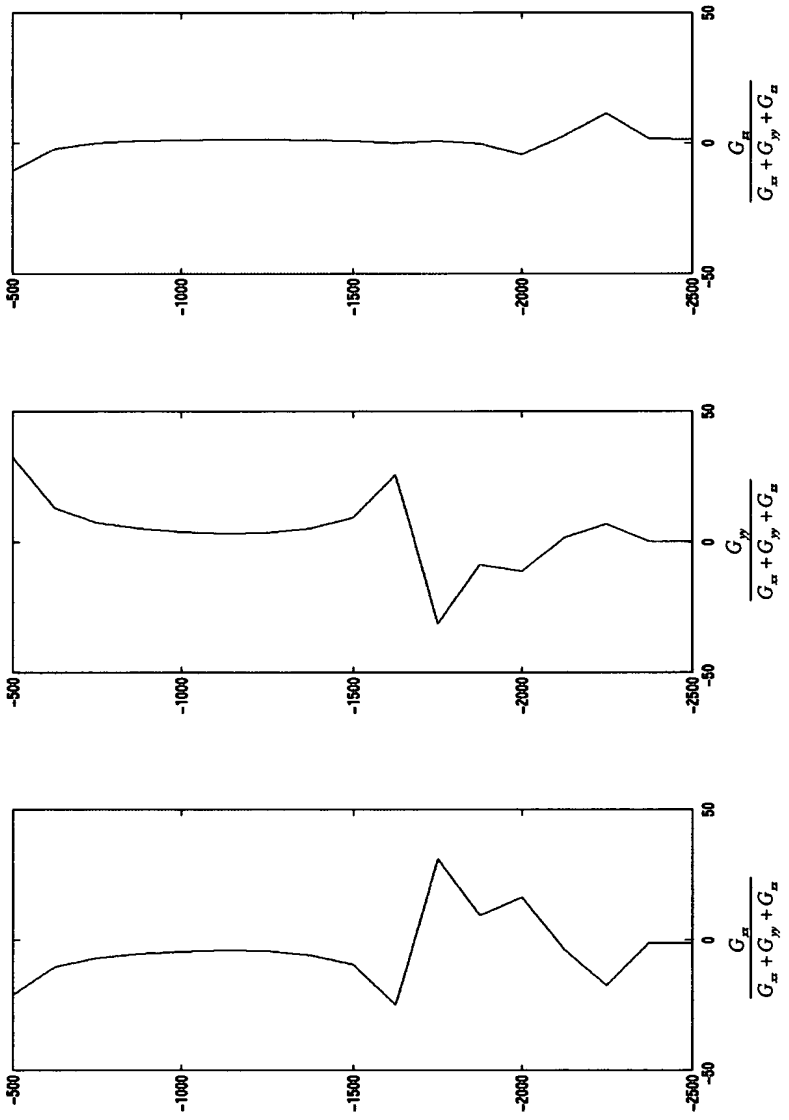

50
0
-50
-500
-1000
-1500
-2000
-2500
$\frac{G_{zz}}{G_{xx}+G_{yy}+G_{zz}}$
803
$\frac{G_{yy}}{G_{xx}+G_{yy}+G_{zz}}$
802
$\frac{G_{xx}}{G_{xx}+G_{yy}+G_{zz}}$
801

Figure 8

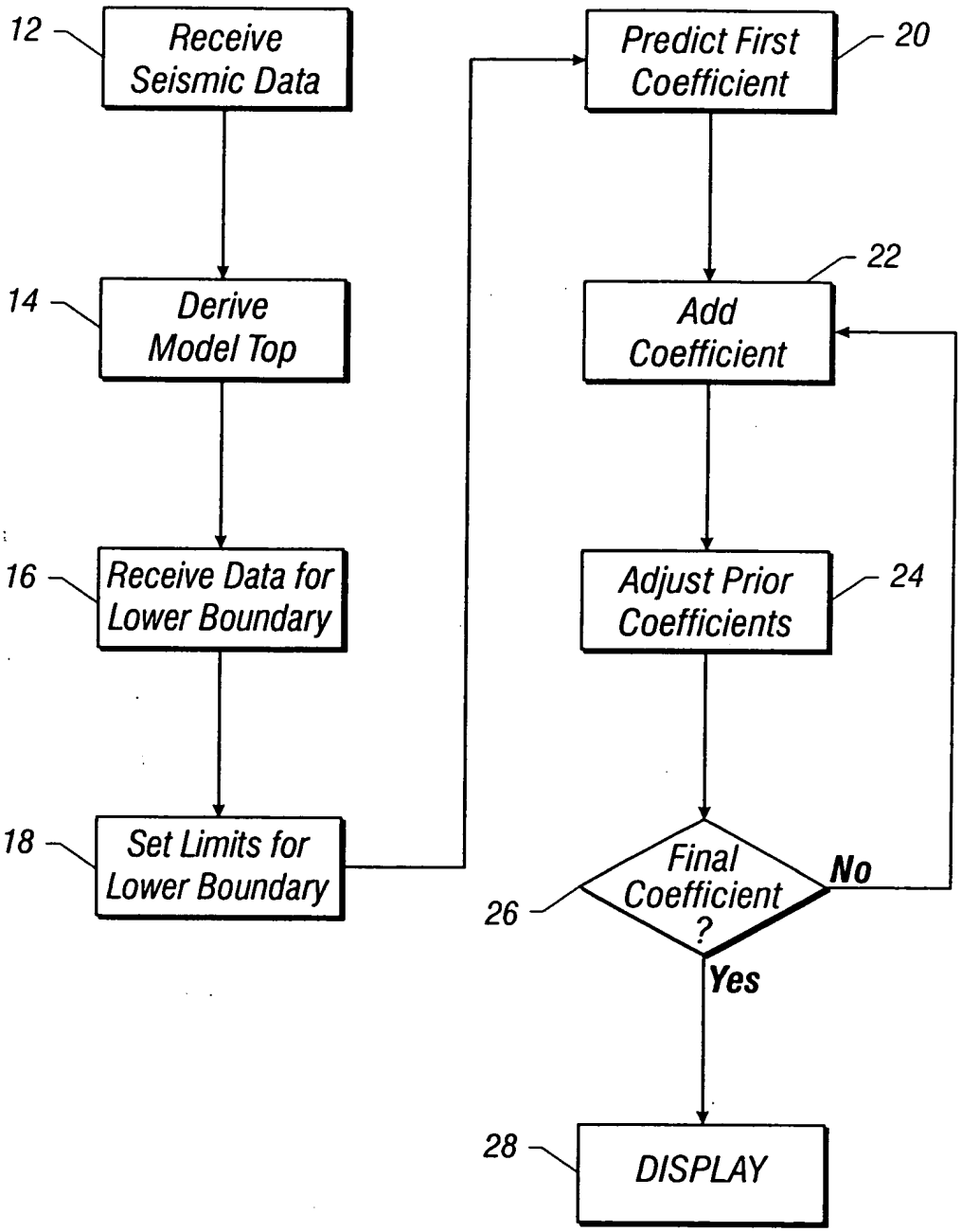

12
Receive Seismic Data
14
Derive Model Top
16
Receive Data for Lower Boundary
18
Set Limits for Lower Boundary
20
Predict First Coefficient
22
Add Coefficient
24
Adjust Prior Coefficients
26
Final Coefficient ?
No
Yes
28
DISPLAY

Figure 9

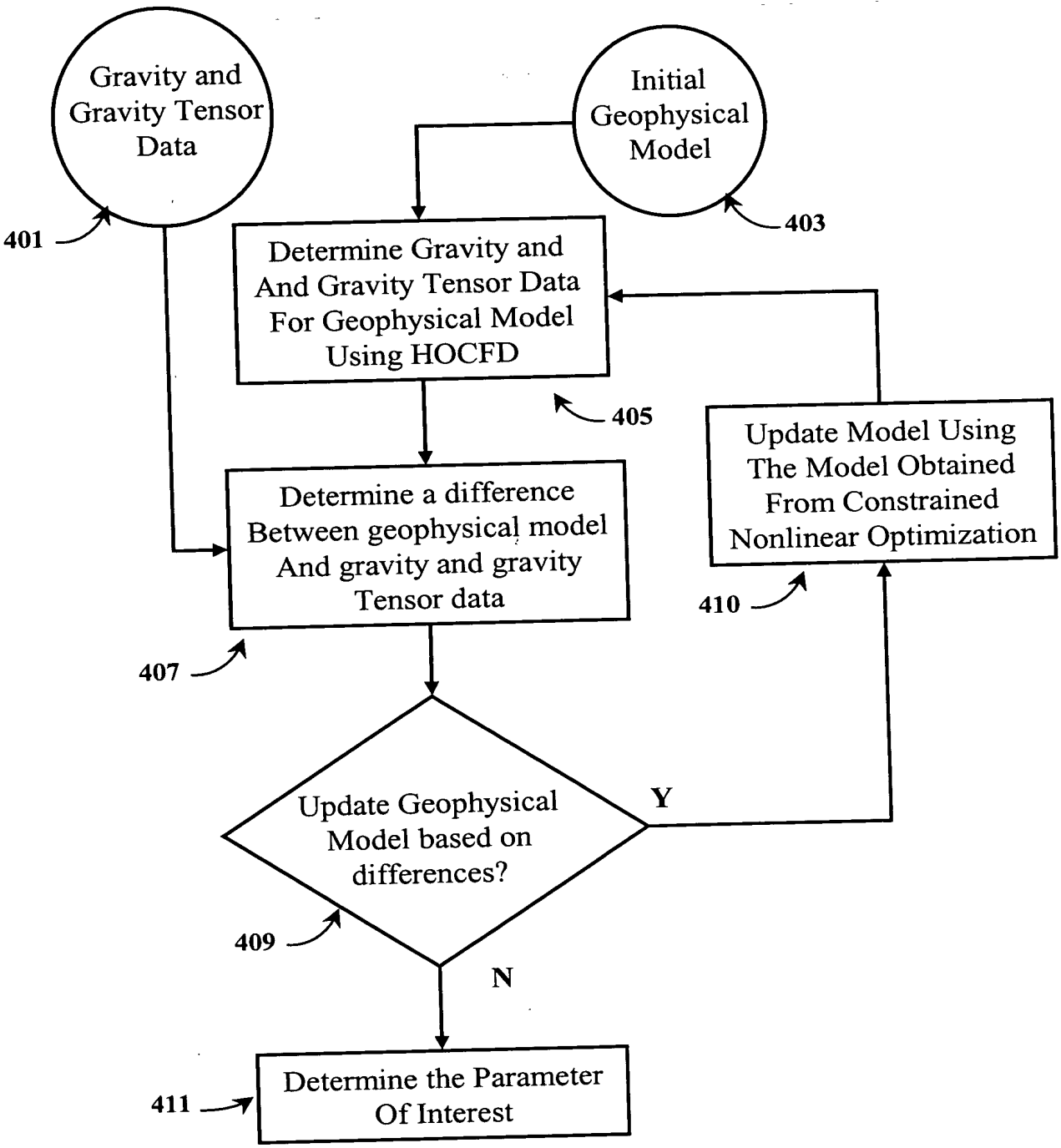

Gravity and Gravity Tensor Data
401
Initial Geophysical Model
403
Determine Gravity and And Gravity Tensor Data For Geophysical Model Using HOCFD
405
Update Model Using The Model Obtained From Constrained Nonlinear Optimization
410
Determine a difference Between geophysical model And gravity and gravity Tensor data
407
Update Geophysical Model based on differences?
Y
409
N
Determine the Parameter Of Interest
411

Figure 10

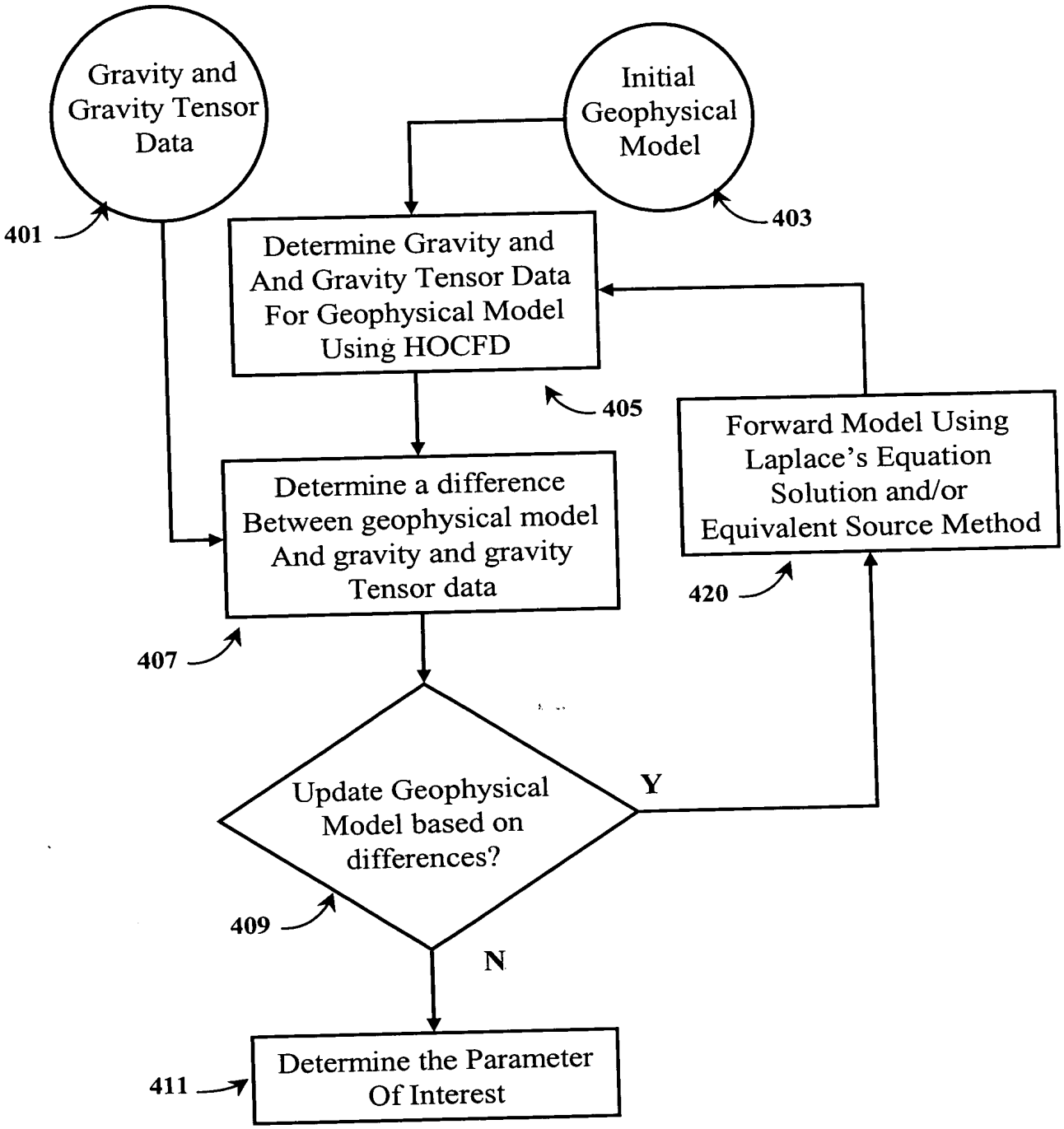

Gravity and Gravity Tensor Data
401
Initial Geophysical Model
403
Determine Gravity and And Gravity Tensor Data For Geophysical Model Using HOCFD
405
Forward Model Using Laplace's Equation Solution and/or Equivalent Source Method
420
Determine a difference Between geophysical model And gravity and gravity Tensor data
407
Update Geophysical Model based on differences?
Y
409
N
Determine the Parameter Of Interest
411

Figure 11

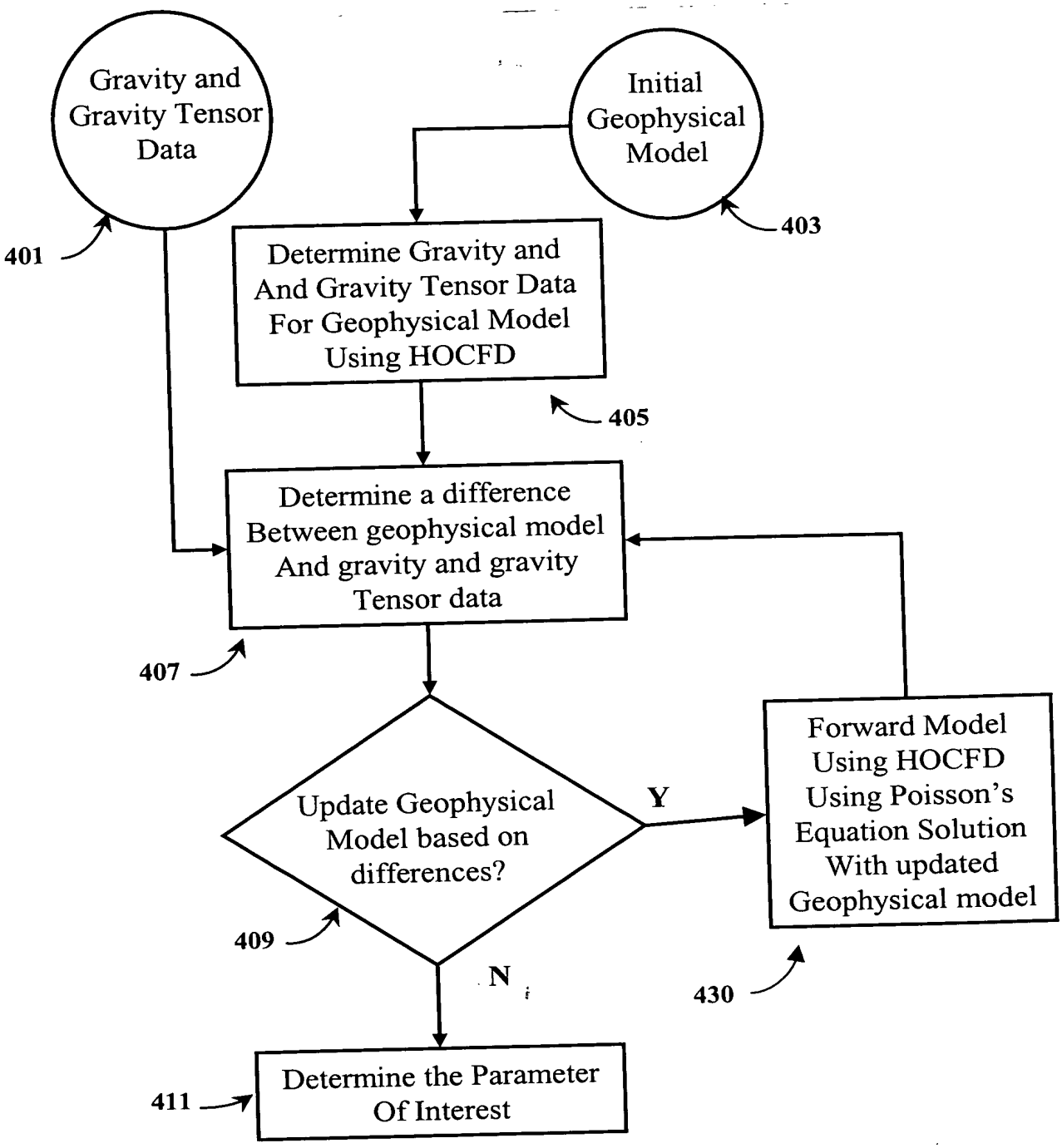

Gravity and Gravity Tensor Data
401
Initial Geophysical Model
403
Determine Gravity and And Gravity Tensor Data For Geophysical Model Using HOCFD
405
Determine a difference Between geophysical model And gravity and gravity Tensor data
407
Update Geophysical Model based on differences?
409
Y
N
Forward Model Using HOCFD Using Poisson's Equation Solution With updated Geophysical model
430
Determine the Parameter Of Interest
411

Figure 12